奇美電子
CHIMEI INNOLUX

PRODUCT SPECIFICATION

☐ Tentative Specification
☐ Preliminary Specification
■ Approval Specification

MODEL NO.: V320BJ2
SUFFIX: P03

Customer:

APPROVED BY **SIGNATURE**

Name / Title _____ _____

Note

Please return 1 copy for your confirmation with your signature and comments.

Approved By	Checked By	Prepared By
Chao-Chun Chung	Vincent Chou	Kevin Tsai

奇美電子 CHIMEI INNOLUX

PRODUCT SPECIFICATION

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REVISION HISTORY

Version	Date	Page (New)	Section	Description
Ver 2.0	May.17,11	All	All	Approval Specification was first issued.

1. GENERAL DESCRIPTION

1.1 OVERVIEW

V320BJ2-P03 is a 32.0" TFT Liquid Crystal Display module. This module supports 1366 x 768 WXGA format and can display 16.7M (8-bit/color) colors.

1.2 CHARACTERISTICS

CHARACTERISTICS ITEMS	SPECIFICATIONS
Screen Diagonal [in]	32.0"
Pixels [lines]	1366×768
Active Area [mm]	697.6845 (H) x 392.26 (V) (32.0" diagonal)
Sub -Pixel Pitch [mm]	0.17025 (H) x 0.51075 (V)
Pixel Arrangement	RGB vertical stripe
Weight [g]	TYP. 1150
Physical Size [mm]	716.1(W) x 410(H) x 1.75(D) Typ.
Display Mode	Transmissive mode / Normally black
Contrast Ratio	3000:1 Typ. (Typical value measured at CMI's module: V315B6-L03)
Glass thickness (Array/CF) [mm]	0.7 / 0.7
Viewing Angle (CR>20)	+88/-88(H),+88/-88(V) Typ. (Typical value measured at CMI's module: V315B6-L03)
Color Chromaticity	R=0.654, 0.330 G=0.282, 0.592 B=0.133, 0.118 W=0.315, 0.362 * Please refer to "color chromaticity" on 7.2
Cell Transparency [%]	5.8%Typ. (Typical value measured at CMI's module: V315B6-L03)
Polarizer (CF side)	Super Wide View Anti-glare coating, 709.7(H) x 405(W) Anti-Glare coating (Haze 11%), Hard Coating (3H)
Polarizer (TFT side)	Super Wide View, 709.7(H) x 405(W). Anti-Glare coating (Haze 11%), Hard Coating (3H)

1.3 MECHANICAL SPECIFICATIONS

Item	Min.	Typ.	Max.	Unit	Note
Weight		1150		g	-
I/F connector mounting position	The mounting inclination of the connector makes the screen center within ±0.5mm as the horizontal.				(2)

Note (1) Please refer to the attached drawings for more information of front and back outline dimensions.

(2) Connector mounting position

+/- 0.5mm

2. ABSOLUTE MAXIMUM RATINGS

2.1 ABSOLUTE RATINGS OF ENVIRONMENT

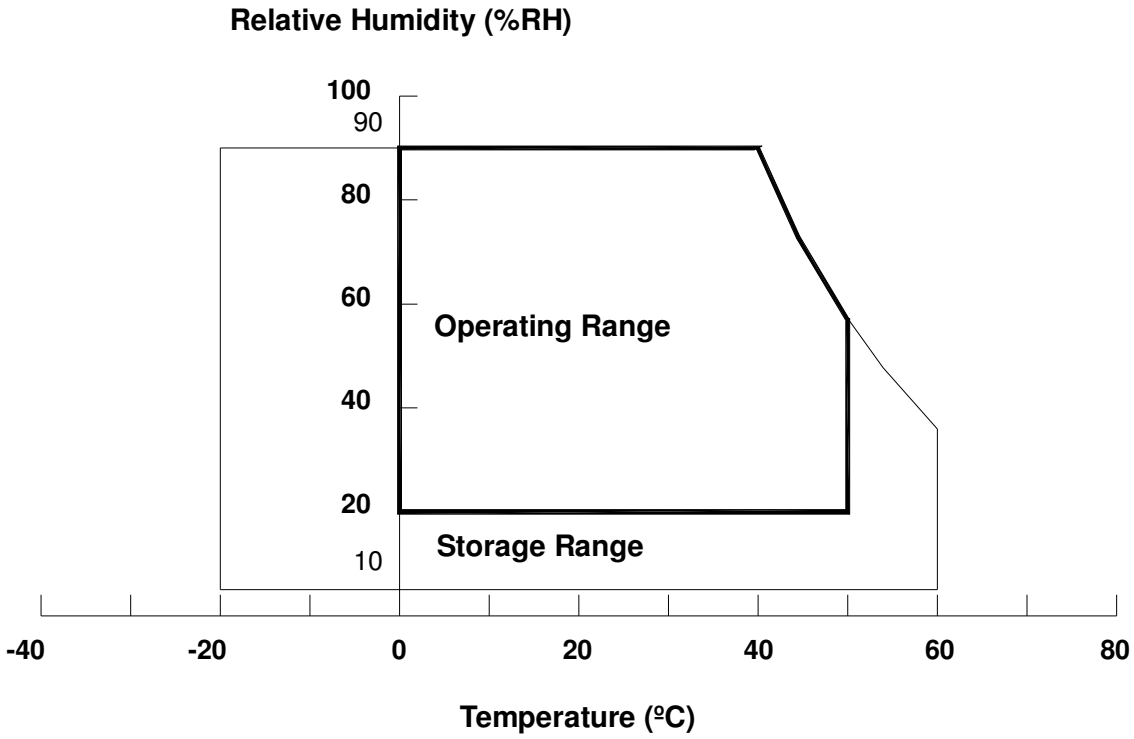
Item	Symbol	Value		Unit	Note
		Min.	Max.		
Storage Temperature	T_{ST}	-20	+60	ºC	(1), (3)
Operating Ambient Temperature	T_{OP}	0	50	ºC	(1), (2), (3)
Altitude Operating	A_{OP}	0	5000	M	(3)
Altitude Storage	A_{ST}	0	12000	M	(3)

Note (1) Temperature and relative humidity range is shown in the figure below.

(a) 90 %RH Max. (Ta ≦ 40 ºC).

(b) Wet-bulb temperature should be 39 ºC Max. (Ta > 40 ºC).

(c) No condensation.



Note (2) The maximum operating temperature is based on the test condition that the surface temperature of display area is less than or equal to 65 ºC with LCD module alone in a temperature controlled chamber. Thermal management should be considered in your product design to prevent the surface temperature of display area from being over 65 ºC. The range of operating temperature may degrade in case of improper thermal management in your product design.

Note (3) The rating of environment is base on LCD module. Leave LCD cell alone, this environment condition can't be guaranteed. Except LCD cell, the customer has to consider the ability of other parts of LCD module and LCD module process.

2.2 ABSOLUTE RATINGS OF ENVIRONMENT (OPEN CELL)

Storage Condition: With shipping package.

Storage temperature range: 25±5 ℃

Storage humidity range: 50±10%RH

Shelf life: a month

2.3 ELECTRICAL ABSOLUTE RATINGS

2.3.1 TFT LCD OPEN CELL

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Power Supply Voltage	Vcc	-0.3	13.5	V	(1)
Input Signal Voltage	V_{IN}	-0.3	3.6	V	

Note (1) Permanent damage to the device may occur if maximum values are exceeded. Functional operation should be restricted to the conditions described under normal operating conditions.

3. ELECTRICAL CHARACTERISTICS

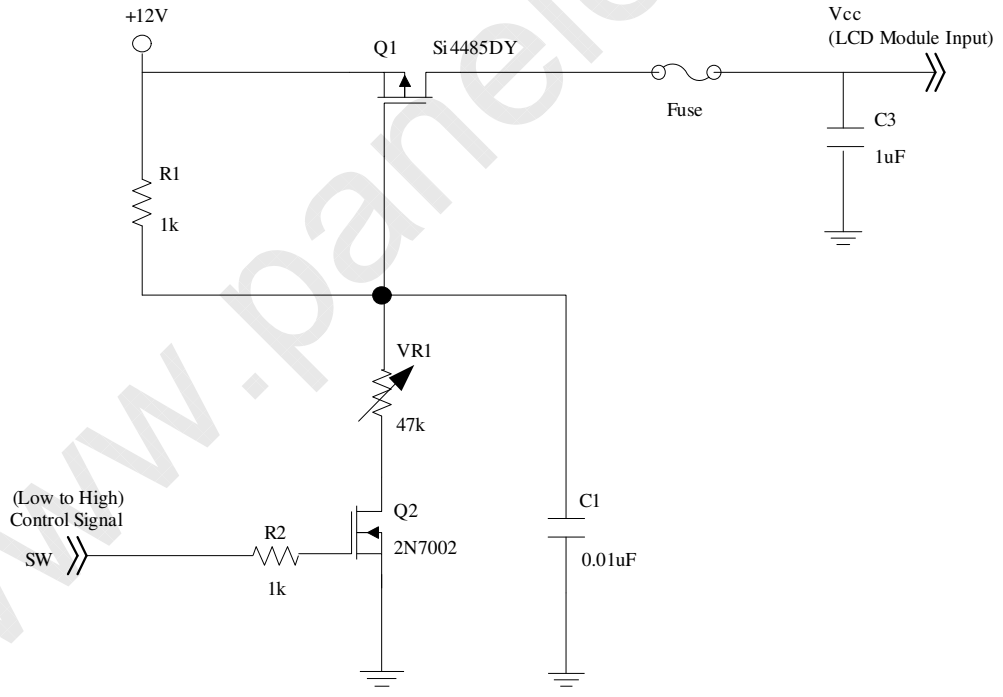
3.1 TFT LCD OPEN CELL

Ta = 25 ± 2ºC

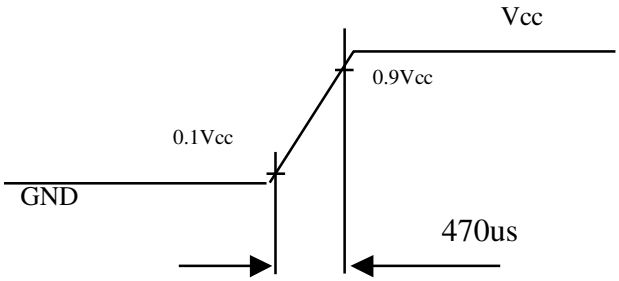
Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max.		
Power Supply Voltage		V_{CC}	10.8	12.0	13.2	V	(1)
Rush Current		I_{RUSH}	-	-	3.9	A	(2)
Power consumption	White Pattern	P_T	—	4.92	6	W	(3)
	Horizontal Stripe		—	5.76	7.08	W	
	Black Pattern		—	3.6	4.44	W	
Power Supply Current	White	I_{CC}	-	0.41	0.5	A	(4)
	Horizontal Stripe		-	0.48	0.59	A	
	Black		-	0.3	0.37	A	
LVDS Interface	Differential Input High Threshold Voltage	V_{LVTH}	+100	-	-	mV	(5)
	Differential Input Low Threshold Voltage	V_{LVTL}	-	-	-100	mV	
	Common Input Voltage	V_{CM}	1.0	1.2	1.4	V	
	Differential input voltage	$\|V_{ID}\|$	200	-	600	mV	
	Terminating Resistor	R_T	-	100	-	ohm	
CMOS interface	Input High Threshold Voltage	V_{IH}	2.7	-	3.3	V	
	Input Low Threshold Voltage	V_{IL}	0	-	0.7	V	

Note (1) The module should be always operated within above ranges.

Note (2) Measurement Conditions:



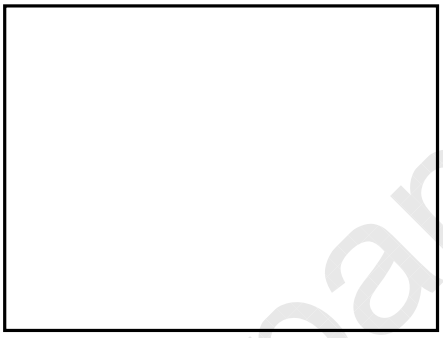
Vcc rising time is 470us



Note (3) The Specified Power consumption is under a,b,c pattern.

Note (4) The specified power supply current is under the conditions at Vcc = 12 V, Ta = 25 ± 2 ºC, f_v = 60 Hz, whereas a power dissipation check pattern below is displayed.

a. White Pattern

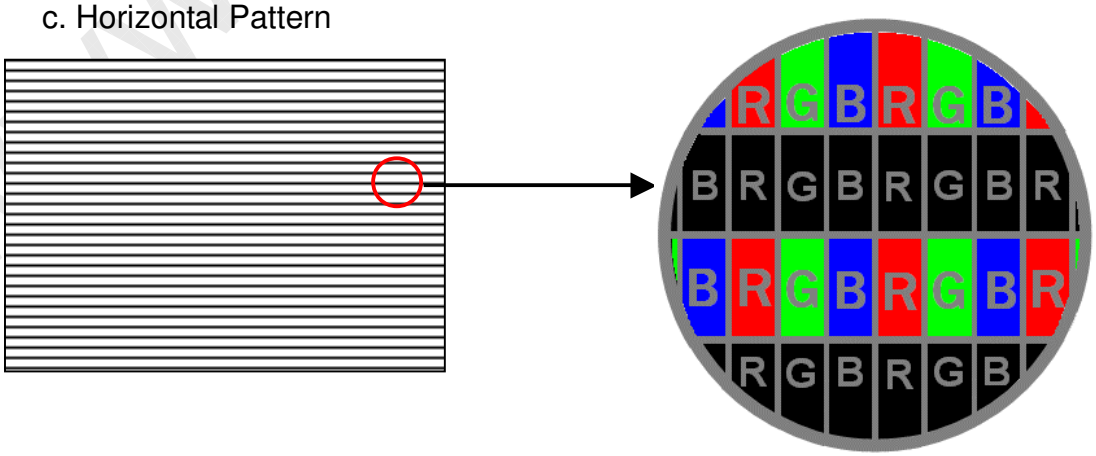


Active Area

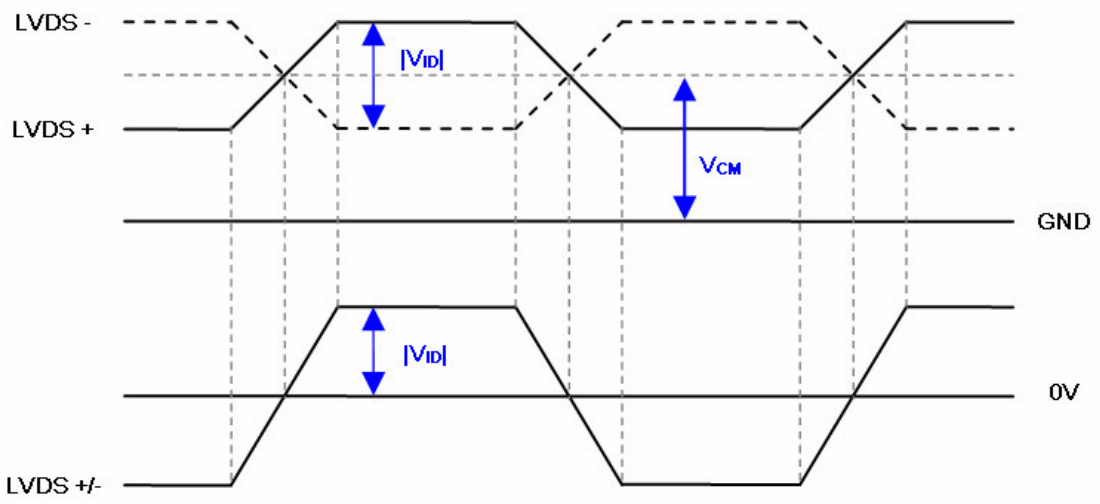
b. Black Pattern

Active Area

c. Horizontal Pattern

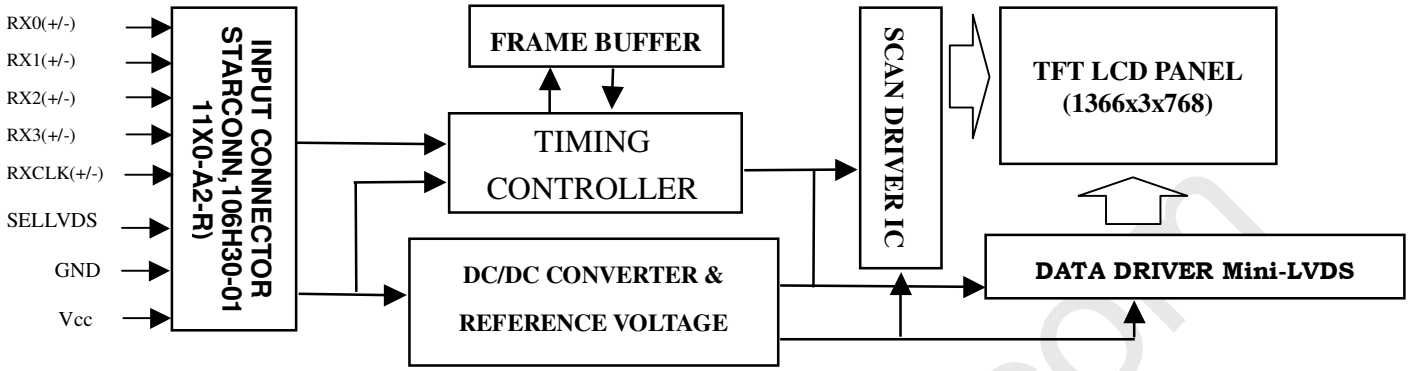


Note (5) The LVDS input characteristics are as follows :



4. BLOCK DIAGRAM

4.1 TFT LCD OPEN CELL



5. INTERFACE PIN CONNECTION

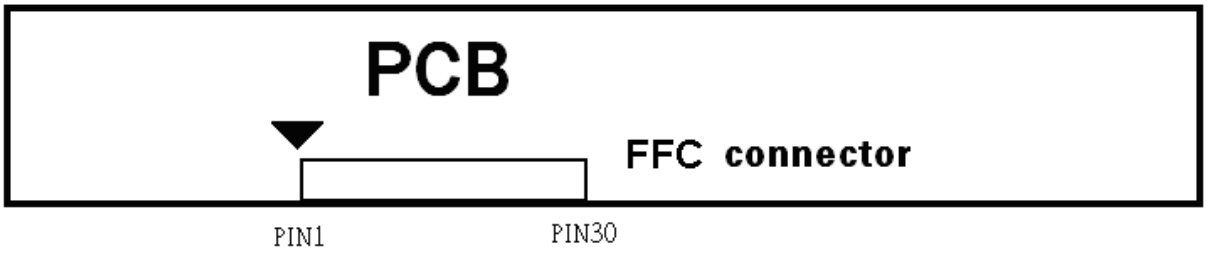
5.1 TFT LCD OPEN CELL

CNF1 Connector Pin Assignment

Pin	Name	Description	Note
1	N.C.	No Connection	(3)
2	SCL	EEPROM Serial Clock	
3	SDA	EEPROM Serial Data	
4	GND	Ground	
5	RX0-	Negative transmission data of pixel 0	
6	RX0+	Positive transmission data of pixel 0	
7	GND	Ground	
8	RX1-	Negative transmission data of pixel 1	
9	RX1+	Positive transmission data of pixel 1	
10	GND	Ground	
11	RX2-	Negative transmission data of pixel 2	
12	RX2+	Positive transmission data of pixel 2	
13	GND	Ground	
14	RXCLK-	Negative of clock	
15	RXCLK+	Positive of clock	
16	GND	Ground	
17	RX3-	Negative transmission data of pixel 3	
18	RX3+	Positive transmission data of pixel 3	
19	GND	Ground	
20	PANEL_SEL	No Connection	(3)
21	SELLVDS	Select LVDS data format	(2)(4)
22	WP	EEPROM Write Protect	
23	GND	Ground	
24	GND	Ground	
25	N.C.	No Connection	(3)
26	VCC	Power supply: +12V	
27	VCC	Power supply: +12V	
28	VCC	Power supply: +12V	
29	VCC	Power supply: +12V	
30	VCC	Power supply: +12V	

Note (1) Connector type: STARCONN 106H30-011100-A2-R or compatible

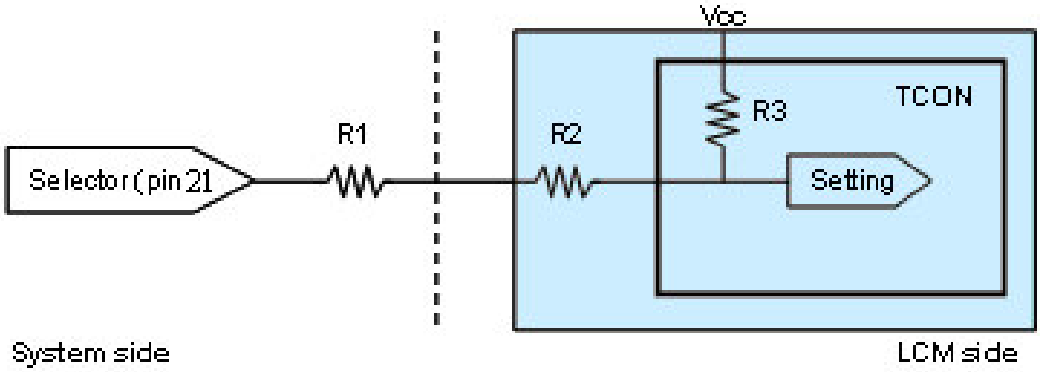
LVDS connector pin order defined as follows



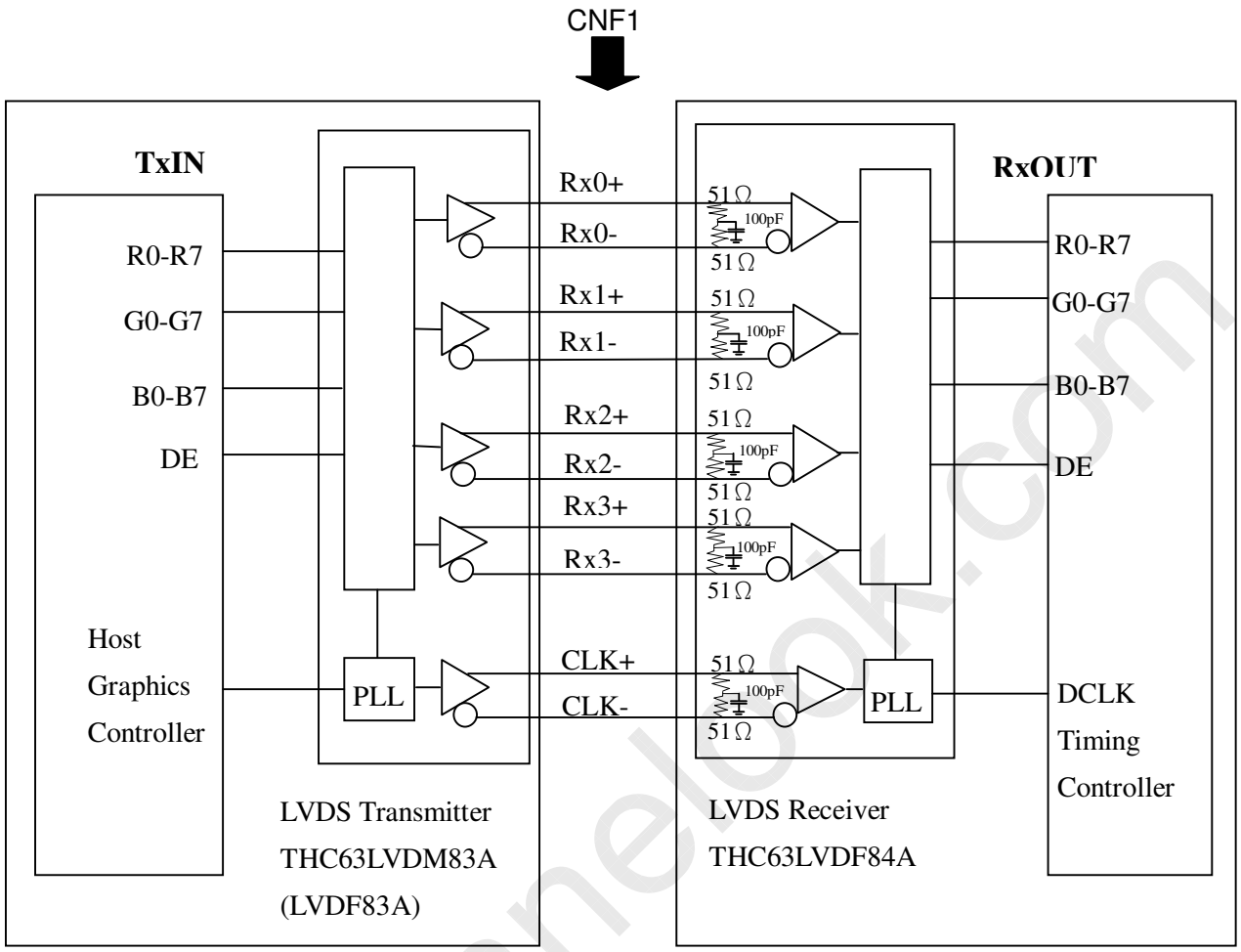
Note (2) High = Connect to +3.3V or Open: VESA Format, Low = connect to GND: JEIDA Format.
Please refer to 5.5 LVDS INTERFACE

Note (3) Reserved for internal use. Left it open.

Note (4) LVDS signal pin connected to the LCM side has the following diagram. R1 in the system side should be less than 1K Ohm. (R1 < 1K Ohm)



5.2 BLOCK DIAGRAM OF INTERFACE

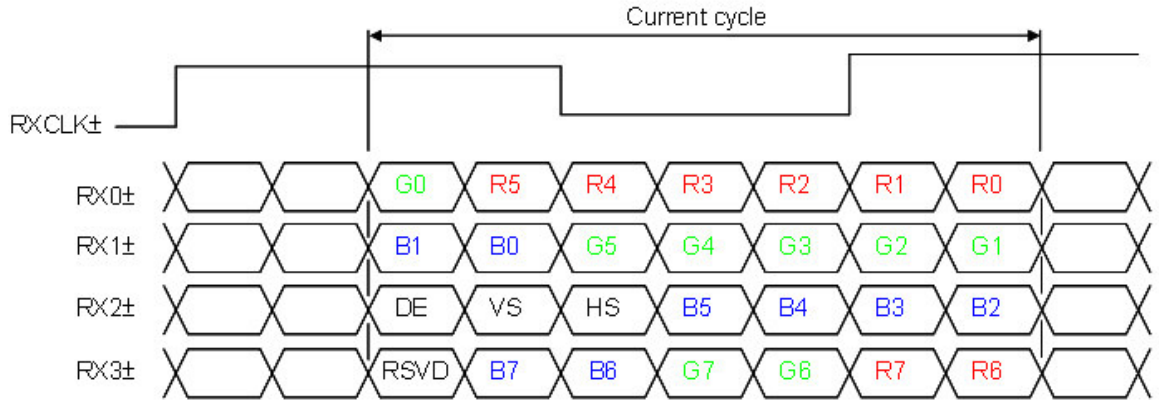


R0~R7 : Pixel R Data ,
G0~G7 : Pixel G Data ,
B0~B7 : Pixel B Data ,
DE : Data enable signal
DCLK : Data clock signal

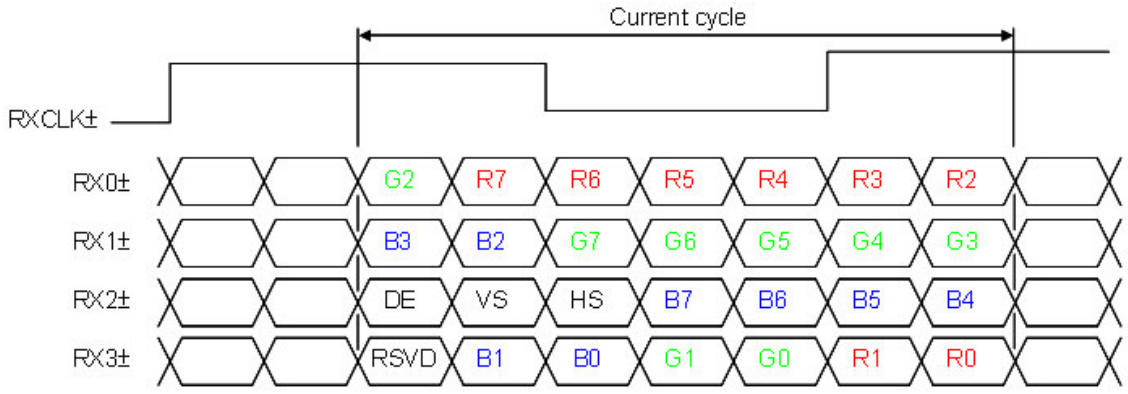
Note (1) The system must have the transmitter to drive the module.
Note (2) LVDS cable impedance shall be 50 ohms per signal line or about 100 ohms per twist-pair line when it is used differentially.

5.3 LVDS INTERFACE

VESA LVDS format：(SELLVDS pin=H or open)



JEDIA LVDS format：(SELLVDS pin=L)



R0~R7: Pixel R Data (7; MSB, 0; LSB)

G0~G7: Pixel G Data (7; MSB, 0; LSB)

B0~B7: Pixel B Data (7; MSB, 0; LSB)

DE : Data enable signal

DCLK : Data clock signal

Notes: (1) RSVD (reserved) pins on the transmitter shall be "H" or "L".

5.4 COLOR DATA INPUT ASSIGNMENT

The brightness of each primary color (red, green and blue) is based on the 8-bit gray scale data input for the color. The higher the binary input, the brighter the color. The table below provides the assignment of the color versus data input.

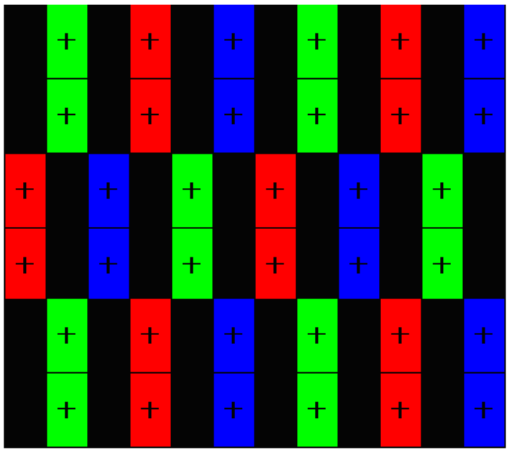
Color		Data Signal																							
		Red								Green								Blue							
		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gray Scale Of Red	Red (0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red (1)	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red (2)	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red (253)	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red (254)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red (255)																								
Gray Scale Of Green	Green (0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	Green (1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	Green (2)	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0
	Green (253)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
	Green (254)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	Green (255)																								
Gray Scale Of Blue	Blue (0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Blue (1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	Blue (2)	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1
	Blue (253)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0
	Blue (254)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Blue (255)																								

Note (1) 0: Low Level Voltage, 1: High Level Voltage

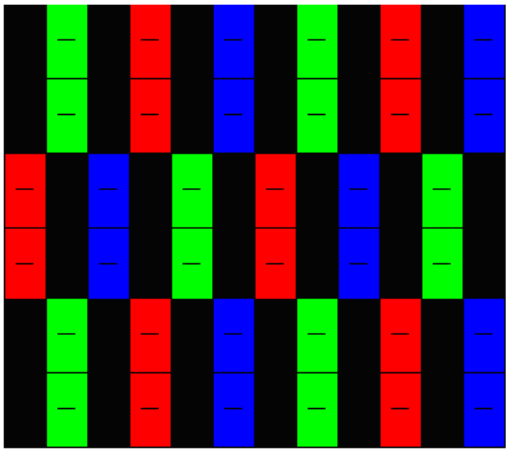
5.5 PATTERN FOR VCOM ADJUSTMENT

2line-inversion pattern (2n+0)

Frame N



Frame N+1



6. INTERFACE TIMING

6.1 INPUT SIGNAL TIMING SPECIFICATIONS

(Ta = 25 ± 2 ℃)

The input signal timing specifications are shown as the following table and timing diagram.

Signal	Item	Symbol	Min.	Typ.	Max.	Unit	Note
LVDS Receiver Clock	Frequency	F_{clkin} (=1/TC)	60	76	82	MHz	
	Input cycle to cycle jitter	T_{rcl}	—	—	200	ps	(2)
	Spread spectrum modulation range	F_{clkin_mod}	F_{clkin}-2%	—	F_{clkin}+2%	MHz	(3)
	Spread spectrum modulation frequency	F_{SSM}	—	—	200	KHz	
LVDS Receiver Data	Setup Time	Tlvsu	600	—	—	ps	
	Hold Time	Tlvhd	600	—	—	ps	
Vertical Active Display Term	Frame Rate	F_{r5}	47	50	53	Hz	
		F_{r6}	57	60	63	Hz	
	Total	Tv	776	806	1018	Th	Tv=Tvd+Tvb
	Display	Tvd	768	768	768	Th	
	Blank	Tvb	8	38	250	Th	
Horizontal Active Display Term	Total	Th	1442	1560	2006	Tc	Th=Thd+Thb
	Display	Thd	1366	1366	1366	Tc	
	Blank	Thb	76	194	640	Tc	

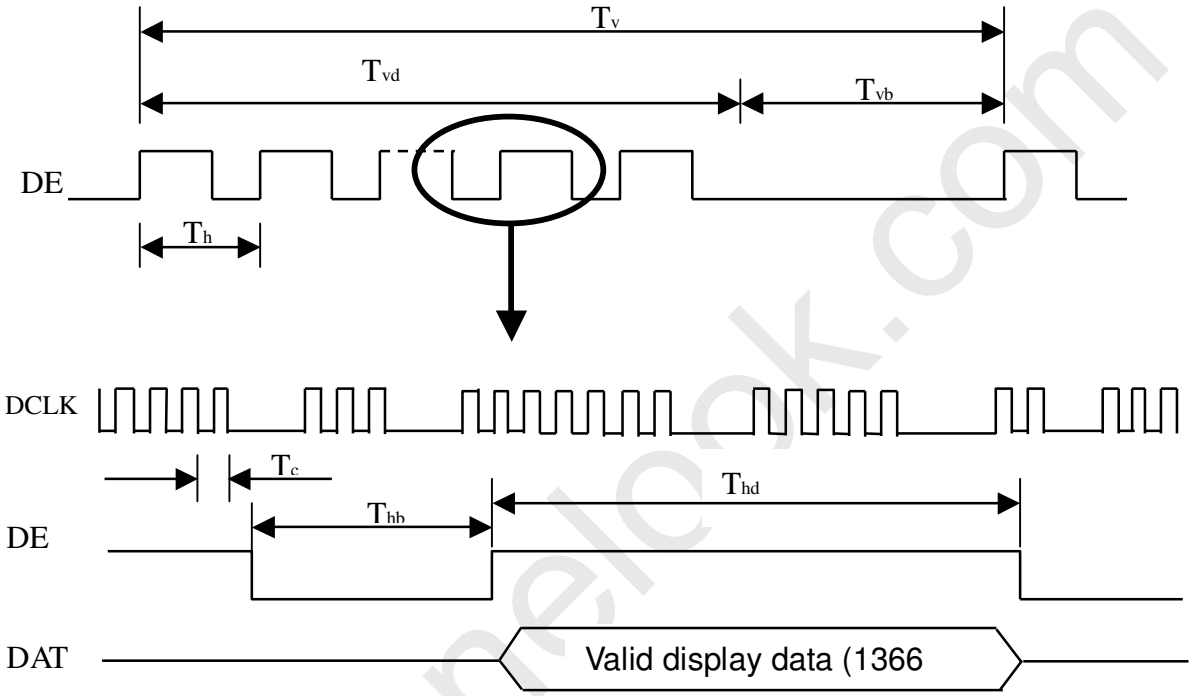
Note (1) Please make sure the range of frame rate has follow the below equation：

$$Fclkin(max) \geqq Fr6 \times Tv \times Th$$

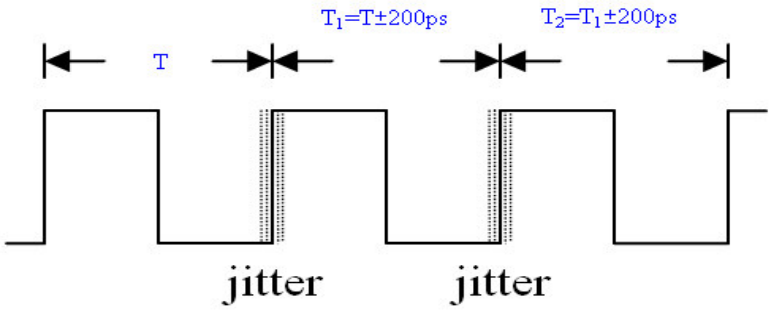
$$Fr5 \times Tv \times Th \geqq Fclkin(min)$$

Note (2) This module is operated in DE only mode and please follow the input signal timing diagram below：

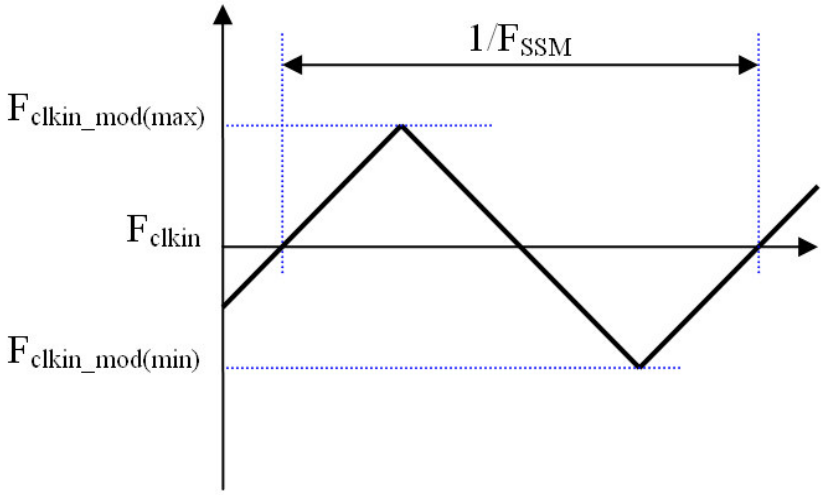
INPUT SIGNAL TIMING DIAGRAM



Note (3) The input clock cycle-to-cycle jitter is defined as below figures. Trcl = I T_1 – TI

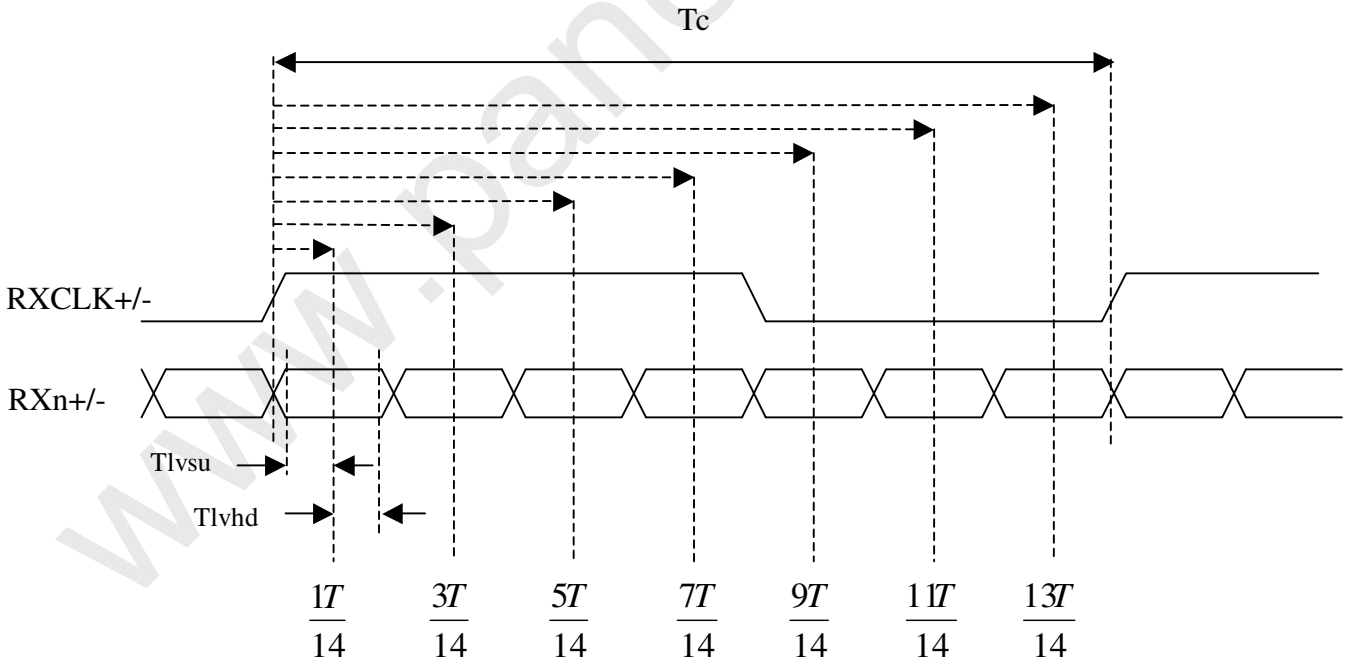


Note (4) The SSCG (Spread spectrum clock generator) is defined as below figures.



Note (5) The LVDS timing diagram and setup/hold time is defined and showing as the following figures.

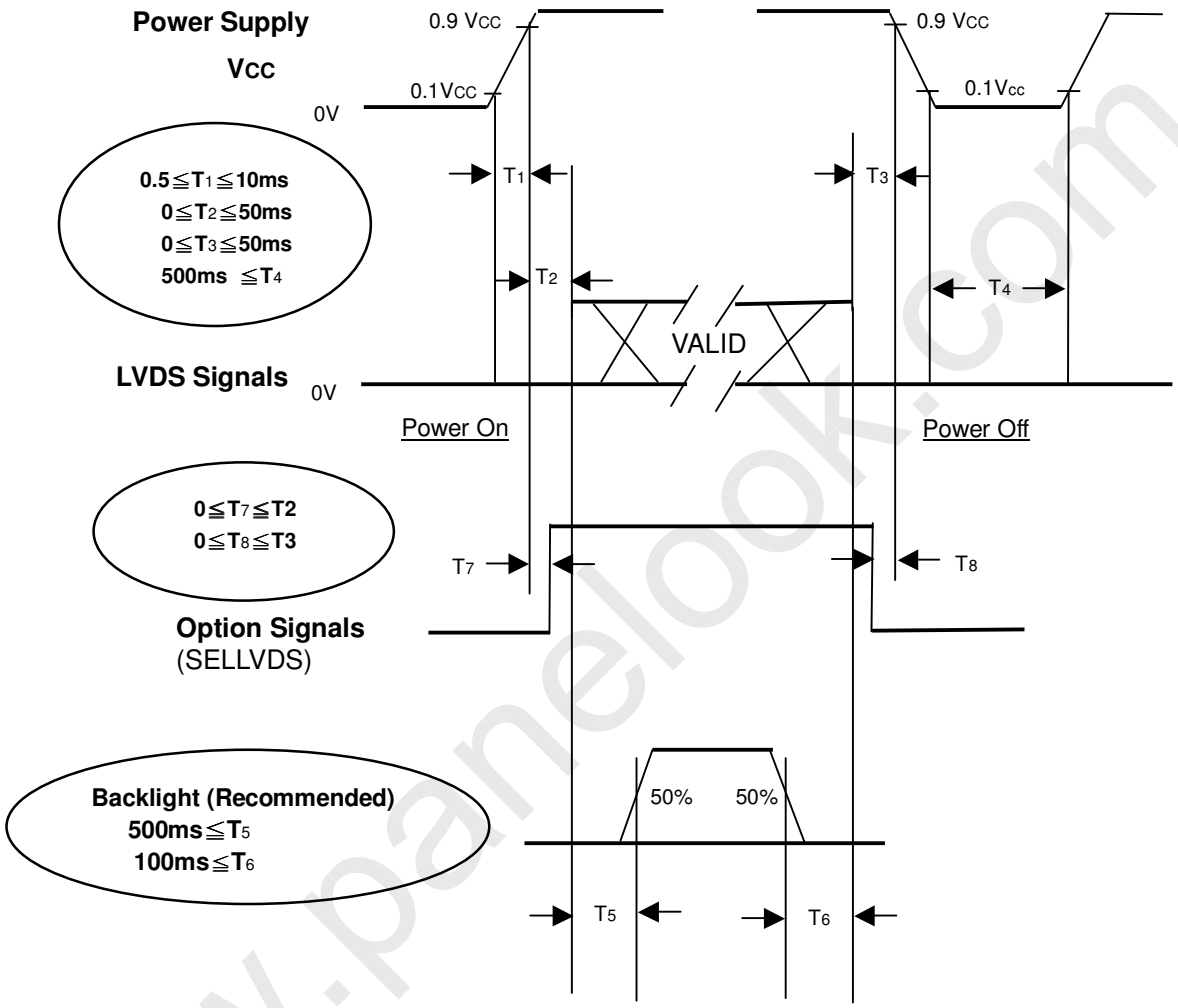
LVDS RECEIVER INTERFACE TIMING DIAGRAM



6.2 POWER ON/OFF SEQUENCE

(Ta = 25 ± 2 ºC)

To prevent a latch-up or DC operation of LCD module, the power on/off sequence should be as the diagram below.



Power ON/OFF Sequence

Note (1) The supply voltage of the external system for the module input should follow the definition of Vcc.

Note (2) Apply the lamp voltage within the LCD operation range. When the backlight turns on before the LCD operation or the LCD turns off before the backlight turns off, the display may momentarily become abnormal screen.

Note (3) In case of Vcc is in off level, please keep the level of input signals on the low or high impedance. If T2<0, that maybe cause electrical overstress failures.

Note (4) T4 should be measured after the module has been fully discharged between power off and on period.

Note (5) Interface signal shall not be kept at high impedance when the power is on.

7. OPTICAL CHARACTERISTICS

7.1 TEST CONDITIONS

Item	Symbol	Value	Unit
Ambient Temperature	Ta	25±2	°C
Ambient Humidity	Ha	50±10	%RH
Supply Voltage	V_{CC}	12.0	V
Input Signal	According to typical value in "3. ELECTRICAL CHARACTERISTICS"		
Inverter Current	I_L	10.5±0.5	mA
Inverter Driving Frequency	F_L	63±3	KHz

7.2 OPTICAL SPECIFICATIONS

The relative measurement methods of optical characteristics are shown as below. The following items should be measured under the test conditions described in 7.1 and stable environment shown in 7.1.

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Color Chromaticity	Red	Rx	θ_x=0°, θ_Y =0° Viewing angle at normal direction With CMI module	Typ.-0.03	0.645	Typ+0.03	-	(0)
		Ry			0.330		-	
	Green	Gx			0.278		-	
		Gy			0.598		-	
	Blue	Bx			0.143		-	
		By			0.167		-	
	White	Wx			0.280		-	
		Wy			0.290		-	
Center Transmittance		T%	θ_x=0°, θ_Y =0° with CMI module	-	5.8	-	%	(1),(6)
Contrast Ratio		CR		-	3000	-	-	(1),(3)
Response Time		Gray to gray	θ_x=0°, θ_Y =0° with CMI Module	-	8.5	-	ms	(1),(4)
White Variation		δW	θ_x=0°, θ_Y =0° with CMI module	-	-	1.3	-	(1),(5)
Viewing Angle	Horizontal	θ_x+	CR≥20 With CMI module	-	88	-	Deg.	(1),(2)
		θ_x-		-	88	-		
	Vertical	θ_Y+		-	88	-		
		θ_Y-		-	88	-		

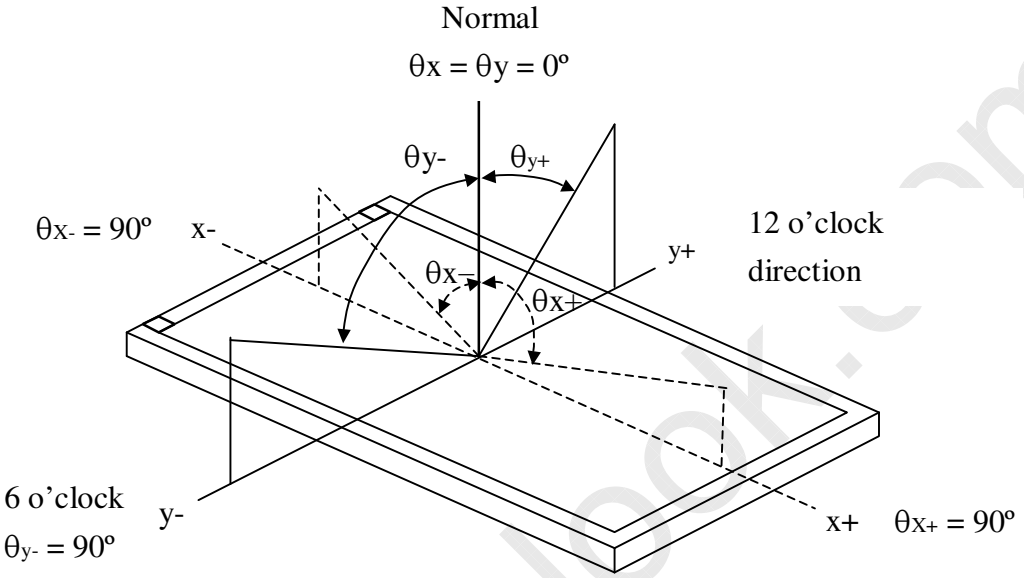
Note (0) Light source is CMI's BLU (V315B6-L03)and driving voltages are based on suitable gamma voltages. The calculated method is as following:

1. Measure Module's and BLU's spectrum at center point. White and R,G,B are with signal input. BLU (for V315B6-L03) is supplied by CMI.
2. Calculate cell's spectrum.

Note (1) Light source is the BLU which supplied by CMI and driving voltage are based on suitable gamma voltages.

Note (2) Definition of Viewing Angle (θx, θy):

Viewing angles are measured by Autronic Conoscope Cono-80



Note (3) Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

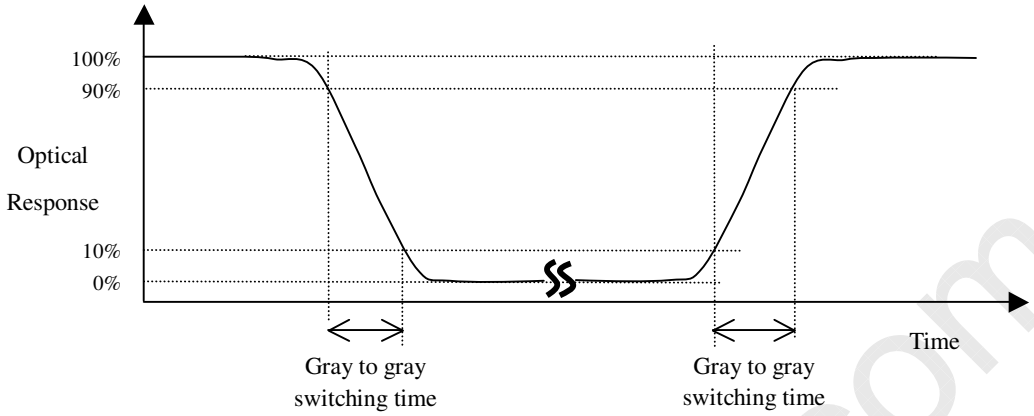
$$\text{Contrast Ratio (CR)} = \frac{\text{Surface Luminance of L255}}{\text{Surface Luminance of L0}}$$

L255: Luminance of gray level 255

L 0: Luminance of gray level 0

CR = CR (5), where CR (X) is corresponding to the Contrast Ratio of the point X at the figure in Note (5).

Note (4) Definition of Gray-to-Gray Switching Time:



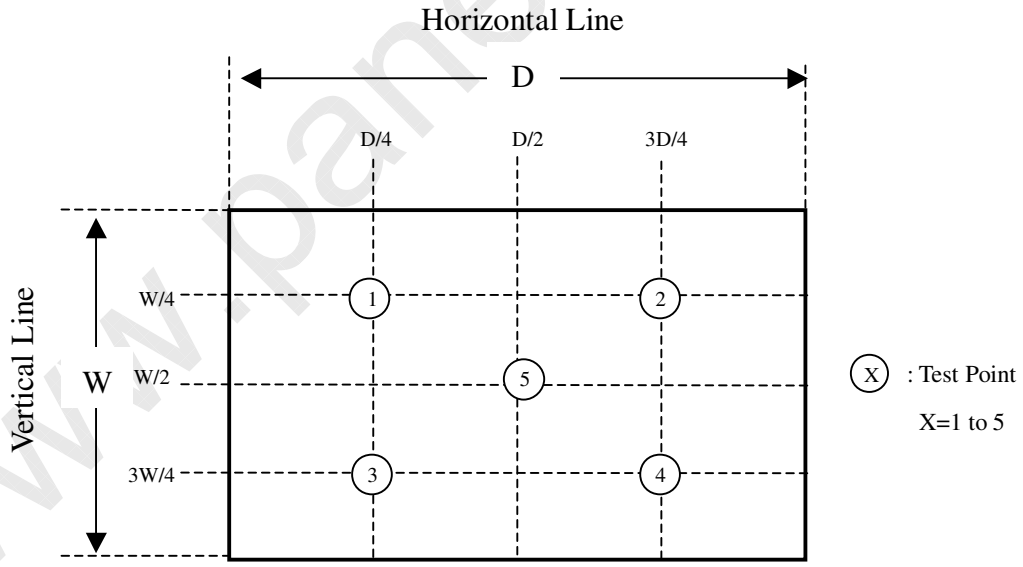
The driving signal means the signal of gray level 0, 124, 252, 380, 508, 636, 764, 892 and 1023.

Gray to gray average time means the average switching time of gray level 0, 124, 252, 380, 508, 636, 764, 892 and 1023 to each other.

Note (5) Definition of White Variation (δW):

Measure the luminance of gray level 255 at 5 points

δW = Maximum [L (1), L (2), L (3), L (4), L (5)] / Minimum [L (1), L (2), L (3), L (4), L (5)]



Note (6) Definition of Transmittance (T%) : Active Area

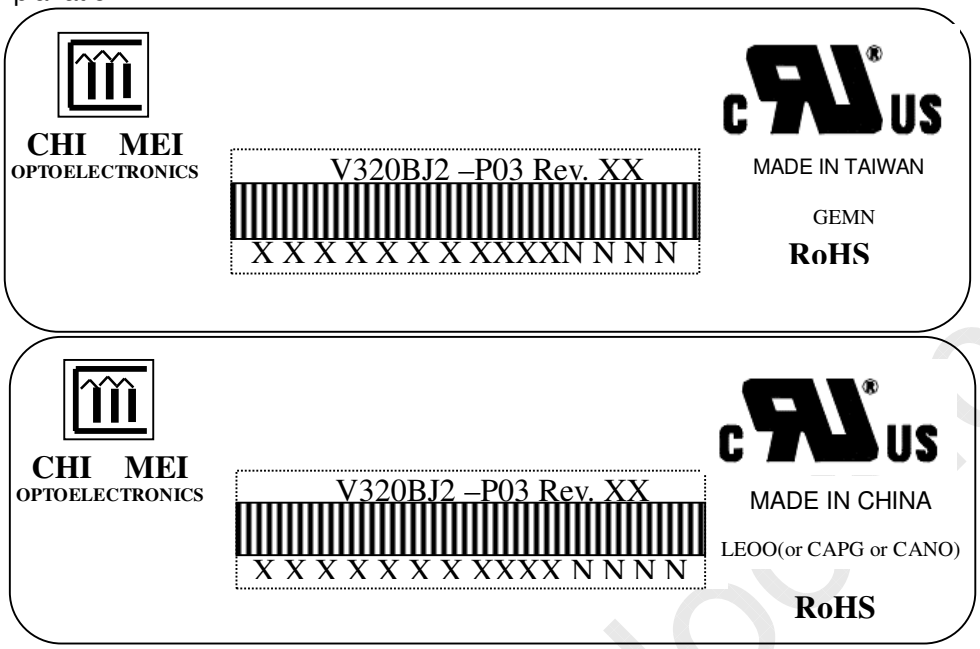
Measure the luminance of gray level 255 at center point of LCD module.

$$\text{Transmittance (T\%)} = \frac{\text{Luminance of LCD module}}{\text{Luminance of backligh unit}} \times 100\%$$

8. DEFINITION OF LABELS

8.1 OPEN CELL LABEL

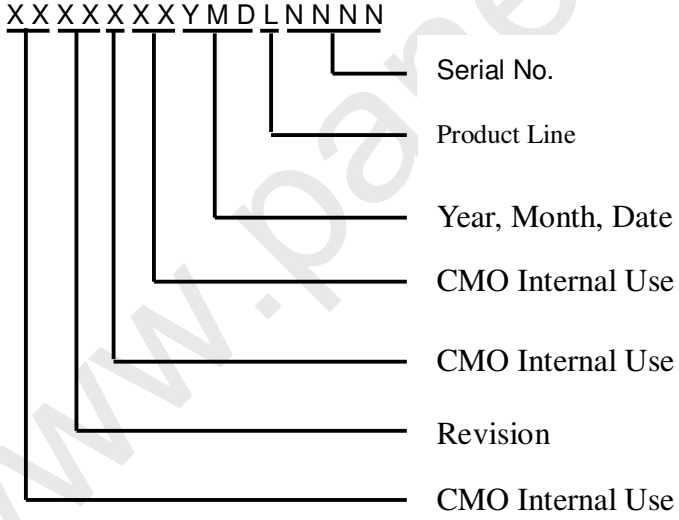
The barcode nameplate is pasted on each module as illustration, and its definitions are as following explanation.



Model Name: V320BJ2-P03

Revision: Rev. XX, for example: A0, A1… B1, B2… or C1, C2…etc.

Serial ID: X X X X X X Y M D L N N N N



Serial ID includes the information as below:

Manufactured Date:

Year: 2010=0, 2011=1,2012=2…etc.

Month: 1~9, A~C, for Jan. ~ Dec.

Day: 1~9, A~Y, for 1st to 31st, exclude I ,O, and U.

Revision Code: Cover all the change

Serial No.: Manufacturing sequence of product

Product Line: 1 -> Line1, 2 -> Line 2, …etc.

9. PACKAGING

9.1 PACKING SPECIFICATIONS

(1) 18 LCD TV Panels / 1 Box

(2) Box dimensions : 970 (L) X 640 (W) X 319 (H)

(3) Weight : approximately 36Kg (18 panels per box)

9.2 PACKING METHOD

Figures 9-1 and 9-2 are the packing method

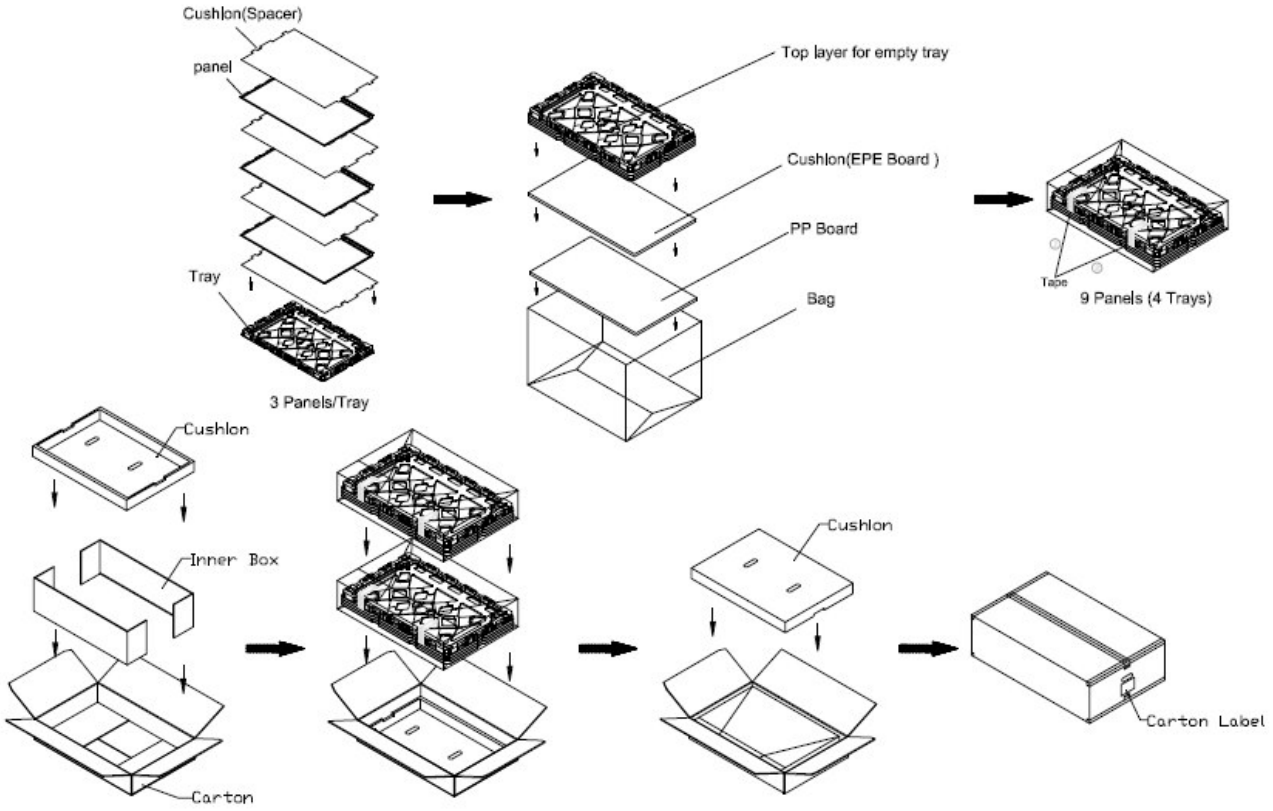
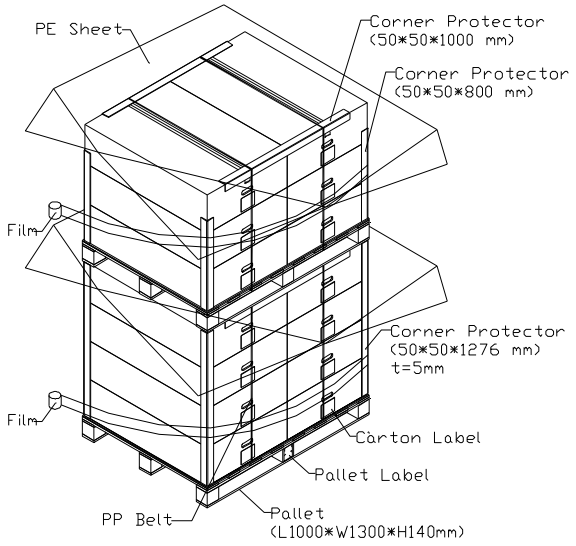
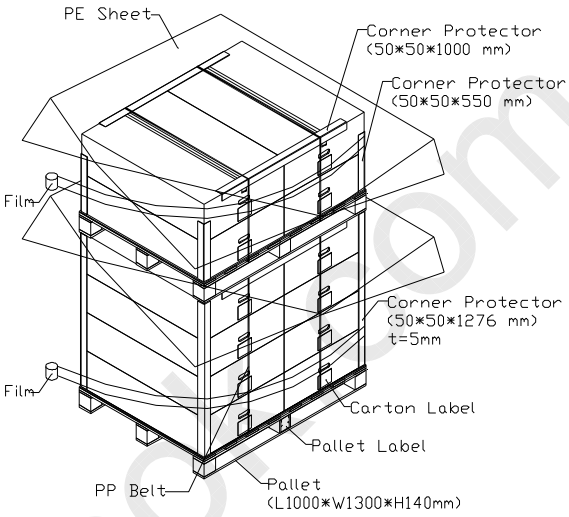


Figure.9-1 packing method

Sea / Land Transportation
(40ft HQ Container)



Sea / Land Transportation
(40ft Container)



Air Transportation

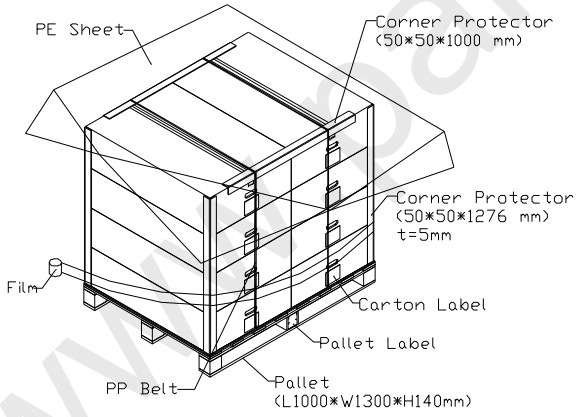


Figure.9-2 packing method

10. PRECAUTIONS

10.1 ASSEMBLY AND HANDLING PRECAUTIONS

(1) Do not apply rough force such as bending or twisting to the product during assembly.

(2) To assemble backlight or install module into user's system can be only in clean working areas. The dust and oil may cause electrical short or worsen the polarizer.

(3) It's not permitted to have pressure or impulse on the module because the LCD panel will be damaged.

(4) Always follow the correct power sequence when the product is connecting and operating. This can prevent damage to the CMOS LSI chips during latch-up.

(5) Do not pull the I/F connector in or out while the module is operating.

(6) Use a soft dry cloth without chemicals for cleaning, because the surface of polarizer is very soft and easily scratched.

(7) It is dangerous that moisture come into or contacted the product, because moisture may damage the product when it is operating.

(8) High temperature or humidity may reduce the performance of module. Please store this product within the specified storage conditions.

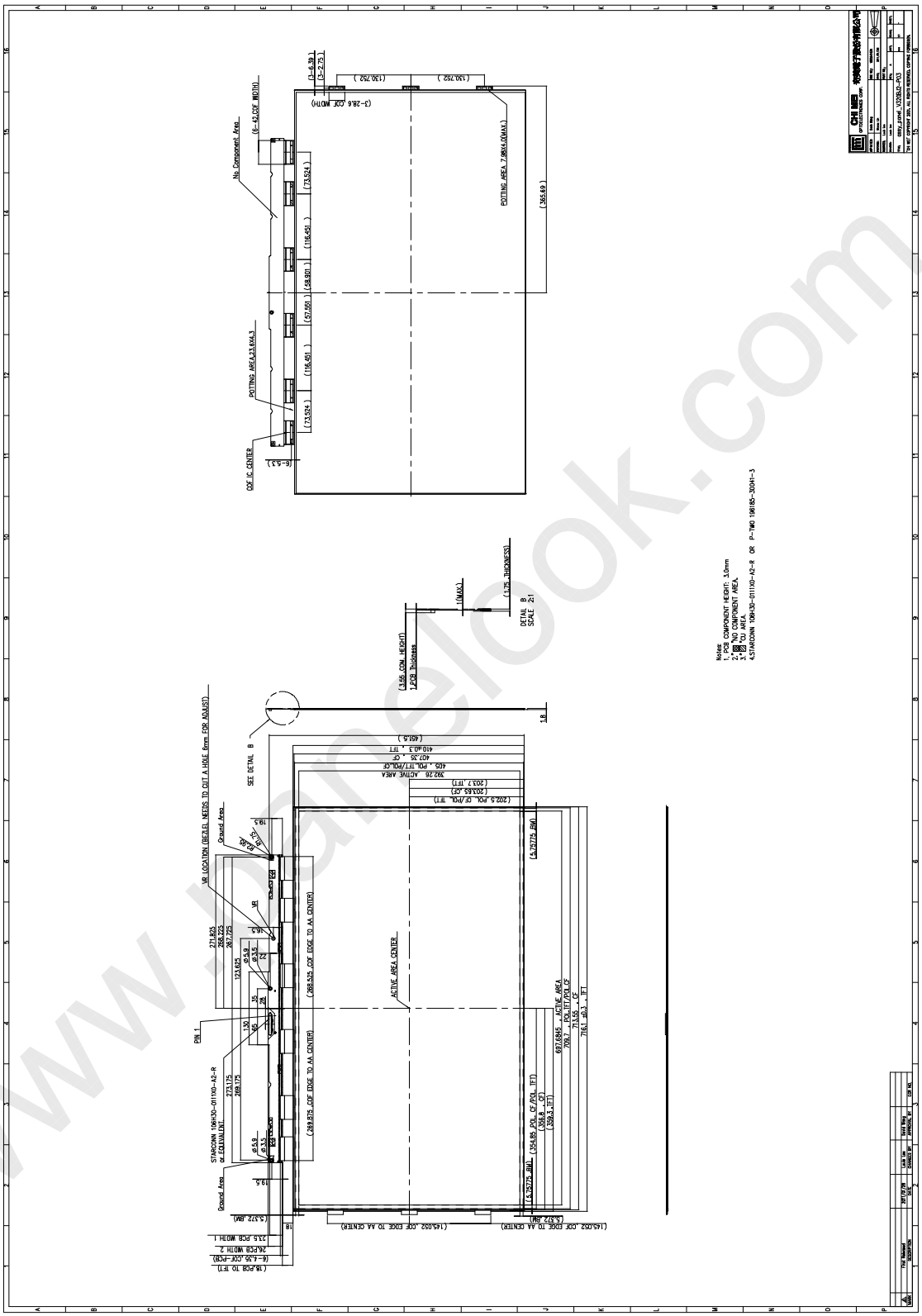
(9) When ambient temperature is lower than 10ºC may reduce the display quality. For example, the response time will become slowly.

10.2 SAFETY PRECAUTIONS

(1) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, skin or clothes, it has to be washed away thoroughly with soap.

(2) After the product's end of life, it is not harmful in case of normal operation and storage.

11. Mechanical Drawing



12. RELIABILITY TEST CONDITION

NO.	Test Item	Test Condition
1	HT Operation	Ta=50℃, 1000hrs
2	HT Storage	Ta=60℃, 500hrs
3	LT Operation	Ta=0℃, 500hrs
4	LT Storage	Ta=-20℃, 500hrs
5	HTHH Operation	Ta=50℃/ 80%RH, 500hrs
6	HTHH Storage	Ta=50℃/ 90%RH, 500hrs
7	Thermal Shock (Non-operation)	[(-20℃ 30min)→(60℃ 30min)]/cycle, 200cycles
8	Image Sticking	Ta=50℃, 300hrs
9	ESD-Air mode Discharge	150pf，330Ω, ±15KV (operation) Class C (With CMI Module)
10	ESD-Contact Mode Discharge	150pf，330Ω, ±8KV (operation) Class B (With CMI Module)
11	Packing Vibration	1.14Grms Random frequency 1~200Hz 30min/Bottom, 15min/Right-Left, 15min/Front-Back
12	Packing Drop	Bottom 31cm+ 4 edges with 15 angle